

# A REPORT ON A COLLECTION OF AMPHIBIANS AND REPTILES FROM THE PONMUDI, KERALA, SOUTH INDIA

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(With five plates)

[Continued from Vol. 81(2): p. 427]

## **Rana temporalis** (Günther) (Plate IV)

*Hylorana temporalis* Günther, 1864, Rept. Brit. India, p. 427, pl. 26, fig. G—Ceylon.

*Rana temporalis* Boulenger, 1882, Cat. Batr. Sal. Brit. Mus. p. 63.

**Material.** 7 adult females 71.0-79.3 mm SV, mean 76.8; 17 adult males 42.9-54.6 mm, mean 50.6; 102 juveniles 13.4-47.0 mm. Tibia 0.56-0.60 of SV in females, mean 0.580, 0.53-0.60 in males, mean 0.558.

The dorsal color pattern of juveniles consists of a light tan band between the dorso-lateral folds and sharply contrasting dark brown sides. As the animals mature, this color pattern gradually gives way to a more generally brown dorsal color, so that in some large females, the dorsal and lateral color is uniform dark tan.

Males have greatly enlarged nuptial pads on the medial side of the first finger, and a large, flat, oval gland on the inner surface of the upper arm. Of our 7 mature females only 2 contained large, pigmented ova.

**Larvae.** A complete developmental series from Stage 29 through metamorphosing individuals, and all size stages to adults confirms the assignment of seven samples of tadpoles to *Rana temporalis*. These larvae have patches of glands similar to those found in larvae of other species of the *Rana* (*Hylarana*) group.

Head-body oval, narrower near snout than

in rear, maximum width midway between eye and end of body, 0.52-0.68 of head-body length; body slightly flattened, depth 0.67-0.73 of width; eyes dorsolateral, not visible from below, eyeball 0.10-0.13 of head-body length (Stages 29-39), interorbital 0.31-0.34 of head-body width, less than eye-snout distance; nostrils dorso-lateral, open, with minute mid-dorsal projection, internarial subequal to interorbital. Oral disk ventral, subterminal, width 0.41-0.52 of head-body width; lower lip with uninterrupted double row of short papillae and 3-6 much longer papillae in each lateral third; upper lip with short papillae in corners; denticles I: 1 + 1/1 + 1: II, the lower rows subequal; divided upper row with wide median gap; beaks black near margins, finely serrated, upper without median convexity. Spiracle sinistral, midway up side, tube fused to body wall, snout-spiracle distance 0.63-0.73 of head-body length. Anal tube dextral, opening level with margin of fin. Tail 1.60-1.83 of head-body length; dorsal margin weakly convex, ventral straight, maximum depth near end of proximal third, depth 0.20-0.26 of tail length, tapering gradually to narrow tip; caudal muscle deeper than fins at basal half; origin of dorsal fin at end of body, dorsal deeper than ventral most of caudal length. An oval patch of whitish glands ventrally on each side at base of hind

limb; an elongate, narrow band of glands dorsolaterally beginning a short distance behind eye and extending almost to end of body. Lateral line pores obscure.

Head-body dark without distinct pattern dorsally, laterally, and anteriorly under the head; tail also dark, with small scattered black spots.

Head-body lengths (mm) : 10.0 (Stage 29), 9.2-11.6 (Stages 30-32), 11.67 (Stage 34), 11.75-12.9 (Stage 39). Maximum total length 33.75 mm (Stage 39). Two individuals in Stage 44 measure 12.2 and 13.2 mm snout-vent.

*Ecological Notes.* This species was taken from 100 to 800 m elevation. Most (92) individuals were collected in evergreen forest, with a few specimens taken in moist-deciduous (5), gallery (4), moist semi-evergreen (1), and secondary growth (3) forest. The species is common both around streams (56) and away from streams in the forest (47). Most individuals were caught either on dead leaves (44) or small rocks (37); the remainder were collected in such divergent habitats as under leaves, on bare soil, and on the leaves and trunks of small herbs, shrubs, and large trees. Seven samples of larvae were taken along forest streams, 6 of them from sheltered side pools and one from a pothole in a rocky bank.

#### ***Philautus charius* Rao**

*Philautus charius* Rao, 1937, Proc. Indian Acad. Sci., 6B : 405, fig. 9—Kottigehar, Kadur, Karnataka.

*Material.* 8 adult females 19.6-22.1 mm SV, mean 20.6; 6 adult males 16.5-18.8 mm, mean 17.2. Tibia 0.48-0.59 of SV in females, mean 0.534; 0.48-0.56 in males mean 0.527.

A small, relatively slender frog with a sharply pointed snout. Fingers are completely free of webbing with large, well-developed disks, from one and one-half to two times width of the subterminal phalanx. Feet are

barely one-third webbed, with webbing not reaching to the second subarticular tubercle on fourth toe; a vestige of webbing between toes 2 and 3, and none between toes 1 and 2. Disks on toes about one and one-half times width of subterminal phalanx. In our sample, there appears to be sexual dimorphism in the amount of webbing, with males having somewhat less webbing than the female described above. Above skin smooth, with small tubercles on eyelid and snout; often extending onto the lateral and dorsal surfaces. Belly granular; throat smooth in females, granular in males. Males with well-developed nuptial pads.

Dorsal color pattern a dark brown background with various amounts of light brown or tan and deep brown on back. Often a pair of dark lines between eyes and groin enclosing an hourglass-shaped area sometimes filled with light brown. Forearms, thighs, calves, and feet heavily barred with dark brown. A dark spot on sides of body always present, forming a continuation of largest leg bar when limbs flexed into normal sitting posture. Ventral surface white with variable amounts of dark brown flecking, forming a vermiculated pattern across belly in darkest individuals.

*Taxonomic Notes.* These frogs do not precisely fit Rao's description (1937), which provides no indication of the amount of intra-specific variation. Our material differs from the type in having less webbing (one-third to one-half webbed in the type) and in size (the type is 23 mm SV, while our largest individual is only 22.1). Rao's description of the interorbital space relative to the eyelid and distance between the eye and nostril does not coincide with his figure of the type; our animals are similar to his figure. However, since our locality is nearly 600 km south of the type locality, such differences between the type and our specimens is not surprising.



*Ecological Notes.* All but 2 of our 14 specimens came from evergreen forest between 290 and 650 m; the remaining 2 were collected in moist-deciduous forest at 300 m. All specimens were found far from water on the forest floor, either on the surface of dead leaves (9 specimens) or beneath leaves or logs (4).

***Philautus femoralis* (Günther)**

*Ixalus femoralis* Günther, 1864, Rept. Brit. India, p. 434, pl. 26, fig. D—Ceylon.

*Rhacophorus (Philautus) femoralis* Ahl, 1931, Das Tier., Lief. 55 : 73.

*Material.* 3 adult females 23.3-24.0 mm SV, mean 23.6; 18 adult males 19.4-22.8 mm, mean 20.9. Tibia 0.48-0.53 of SV in females, mean 0.509; 0.49-0.55 in males, mean 0.513 (n = 11).

Habitus slender, snout relatively short and rounded. Canthus rostralis moderate, lores not or only very slightly concave. Upper eyelids relatively small, much narrower than interorbital distance. Tympanum barely visible; no supratympanic fold. Toes about three-fourths webbed with webbing extending to disk on fifth toe, and to disks on lateral sides of third and fourth toes (occasionally only to distal subarticular tubercle on fourth toe); webbing to between middle and distal subarticular tubercle on medial side of fourth toe. A rudiment of webbing between fingers. Disks of fingers well developed, about one and one-half times width of penultimate phalanx; those of toes less than one and one-half times diameter of penultimate phalanx. Skin smooth dorsally, granular beneath, with a granular throat in males only. Males have a well-developed nuptial pad on the first finger.

Dorsal color pattern variable, ranging from uniform deep purple (in preservative) through a series of patterns of purple-brown spots on a tan background to uniformly tan, with only a dark streak along side of head. In the pur-

ple individuals (most of the series), the same color is found on the upper surfaces of the forearms and calves, and a thin line of purple extends the length of the thigh and foot. Lower arm, most of thigh and foot, and sides are immaculate yellowish-white, as are the hands. In those individuals with a spotted or tan dorsum, the limb coloration is also more diffuse, with purple areas often represented as a tan series of crossbars on the forearm and calf. Ventrally all individuals immaculate yellow-white. Males have a well developed nuptial pad on the first finger.

In life, these frogs go through a striking shift in color pattern which is reflected in the variation in preserved animals. Freshly caught specimens are invariably a uniform leaf-green (purple in preservative), with yellow-cream sides (Plate IV). As the animals are held in captivity, the color shifts to brown with cream dorsolateral stripes (Plate V); the spotted individuals presumably represent those in the process of changing color.

*Taxonomic Notes.* We have compared our frogs with the types of *Philautus femoralis* (Günther), *P. fergusonii* (Günther), *P. pulchellus* (Günther), and *P. beddomii* (Günther) : all but the last species were placed in the synonymy of *P. femoralis* by Boulenger (1882). The types of *P. pulchellus* and *P. fergusonii* are in a poor state of preservation, and can only be said to agree with our material and with the type of *P. femoralis* in general habitus and the overall purple coloration. Our material agrees with the type (BMNH 1947.2.26.89) of *femoralis* very closely in size, color pattern (the type has the common, uninterrupted purple color), and webbing. As in *P. temporalis* (see below), our specimens have a more pointed snout in profile than the type, which appears to be an artifact of preservation. Our material is similar in general

color pattern to the *P. beddomi* type series, although these individuals have the purple broadly covering the lower arms, thighs, and feet, a condition never found in our sample. *Philautus beddomi* also differs significantly from our specimens in having much less webbing on the hind feet.

*Ecological Notes.* We found this species exclusively in disturbed, secondary growth or open grassy situations between 840-900 m. Virtually all specimens were collected from the leaves of 1-3 m tall shrubs, usually far from any stream or pond. The frogs were all collected at night, generally by following calling males, which explains the very uneven sex ratio in our sample.

***Philautus signatus* (Boulenger)**

*Ixalus signatus* Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., p. 106, pl. 11, fig. 2—Malabar.

*Rhacophorus (Philautus) signatus* Ahl, 1931, Das Tier., Lief. 55 : 77.

*Material.* 1 adult female 27.0 mm SV, 10 adult males 21.2-23.1 mm, mean 22.0. Tibia 0.54 of SV in female; 0.49-0.53 in males, mean 0.521.

Overall habitus stocky, relatively robust, with extremely large, protruding eyes, pointed snout, and a sharp, curved canthus rostralis. Toes barely half-webbed, with webbing not quite reaching second subarticular tubercle of fourth toe, and no webbing present on first toe. Disks of toes moderate, about one and one-half times diameter of penultimate phalanx. Fingers without webbing; subarticular tubercles prominent. Disks of fingers about one and one-half times width of finger. The skin smooth above, coarsely granular below, granulations extending onto underside of thighs near groin. As in most *Philautus*, the throat is smooth in females, granular in males.

Dorsally all individuals brown with a few irregular dark brown markings in temporal re-

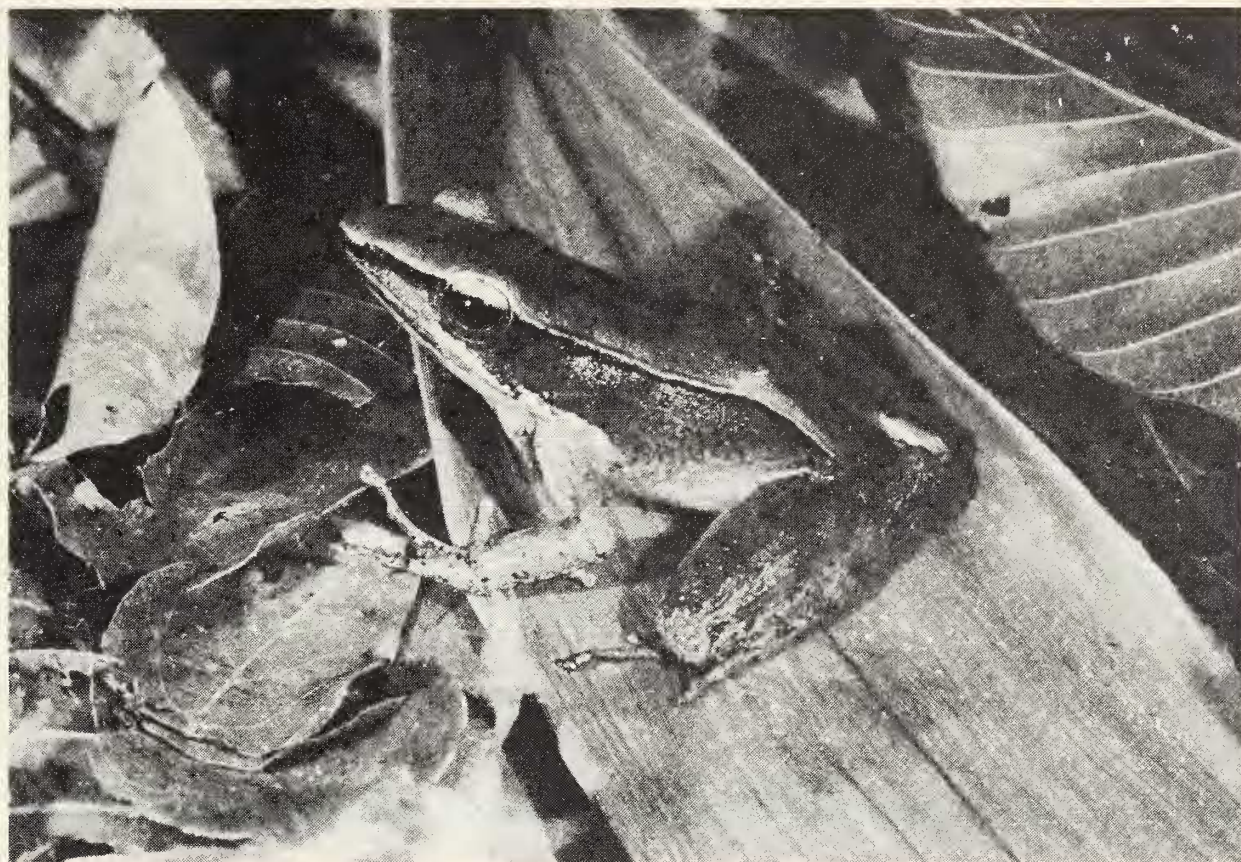
gion. A faint pair of brown spots about one-half the diameter of the eye often present in scapular area. "X" pattern on the back is variably present, consisting of a dark, hour-glass pattern of light brown starting at eyes and extending the length of back. Front and hindlimbs barred with dark brown, barring generally becoming a brown marbling pattern on yellow-brown background color along posterior surface of thighs. Ventral coloration white with tiny black flecks; more densely concentrated on the throat and underside of the thighs, producing a dusky coloration.

In life, dorsal surface pale brown, the side of the head with small, dark flecks. The inguinal region and anterior surface of the thigh vermiculated with black-brown; the rear of the thigh yellow-green with black reticulations. The iris is silvery, with turquoise along its dorsal margin.

The distinctive marbled pattern of the groin illustrated by Annandale (1919) is not always present. In our material, the single female has a strong pattern of dark brown reticulations along the anterior side of the thigh and on the groin, extending along the lateral surface of the body one-half the distance of the axilla. This pattern is present in a reduced form in a single male (RFI-30931); otherwise the groin is light tan with occasional dark smudges.

*Taxonomic Notes.* The designation of these frogs is questionable, primarily because of the lack of a lingual papilla in our series. However, the extent of variation, both geographically and within populations, in this structure has never been adequately documented. Annandale (1919) noted that the papilla varies from inconspicuous to prominent in the related *P. bombayensis*, and Kirtisinghe (1957, p. 12) does not consider this character to be of specific value. Otherwise, our material





*Above: Rana temporalis.*

*Below: Philautus femoralis.* Typical colour phase when calling.





*Above: Philautus femoralis.* Dark color phase.  
*Below: Rhacophorus malabaricus.* A pair in amplexus.



agrees well with Boulenger's description, and with Wall's (1922) account of the call and general habits.

*Ecological Notes.* As with *P. femoralis*, this species was collected in open grassy areas between 920-950 m, far from any stream or pond. However, unlike *P. femoralis*, few individuals were found on small shrubs (3). Instead, most specimens were collected under leaves (1), on the soil surface (5), or on rocks (2). Whether this represents a case of ecological displacement between these two species deserves additional attention. Most specimens collected were calling males.

***Philautus temporalis* (Günther)**

*Ixalus temporalis* Günther, 1864, Rept. Brit. India, p. 434 pl. 26, fig. E—Ceylon.

*Rhacophorus (Philautus) temporalis* Ahl, 1931, Das Tier., Lief. 55 : 97.

*Material.* 5 adult females 25.4-26.2 mm SV, mean 25.7; 13 adult males 18.7-25.6 mm, mean 21.1. Tibia 0.50-0.53 of SV in females mean 0.513; 0.47-0.56 in males, mean 0.498.

A small, slender species with pointed snout, sharp, slightly curved canthus rostralis, and weakly concave lores. A distinct, curved supratympanic fold from eye to shoulder. Tympanum very distinct, about half diameter of eye in both males and females. Feet about one-third webbed, webbing reaching second subarticular tubercle on fourth toe, barely to tubercle on first and second toes. Fingers completely free of webbing. Subarticular tubercles weakly developed on both fingers and toes. Skin smooth above, granular below, with a granular throat in males.

Greyish brown to brown dorsally and laterally, generally with a distinct pattern of darker brown longitudinal bars and spots. Markings frequently form an irregular hour-glass pattern extending from eyes to groin. A very distinct black stripe along the supratympanic

fold, extending forward onto the loreal region. Front and hind limbs light tan with brown bars. Ventrally white with flecks of black on belly, more dense on the throat, forelimbs, and thighs. In life, sandy reddish brown above; lores, tympanum and streak below the supratympanic fold dark brown.

*Taxonomic Notes.* Our material agrees very closely with types of *P. temporalis* (BMNH 1947.2.6.8, 10-11) in size, coloration, webbing, and general habitus. The only point of difference is in the shape of the snout in lateral view, which is pointed in our material and relatively blunt in the types. However, in two (BMNH 1947.2.6.10-11) the snout is obviously distorted, with the tip flattened, and it is probable that the shape of the snout is an artifact of preservation.

In retaining the name *P. temporalis*, we follow Ahl (1931) as the last reviewer of the genus. Since we have not examined the types of *P. leucorhinus*, we cannot judge the distinctness of these two species.

*Ecological Notes.* This species uses a wide range of altitudinal and vegetational habitats; specimens were collected from 130 to 900 m in open grassy areas (7), secondary growth (4), evergreen forest (6), and deciduous forest (1). About half (8), all calling males, were found in shrubs or seedlings 0.3 to 2.0 m above the ground. The remaining half were found on the ground, either on dead leaves or bare soil; of these, half were females.

***Philautus variabilis* (Günther)**

*Ixalus variabilis* Günther, 1858, Cat. Batr. Sal. Brit. Mus., p. 74-75, pl 4, fig. A, B—Ceylon.

*Philautus variabilis*, Roux, 1928, Rev. Suisse Zool., 38: 464.

*Material.* 2 adult females 30.3, 31.0 mm SV; 2 adult males 27.0, 28.5 mm. Tibia 0.52 of SV in females; 0.52, 0.53 in males.

Hind feet about two-thirds webbed, with

webbing extending to second tubercle on both sides of fourth toe, and distal tubercle on fifth toe. A slight rudiment of webbing between fingers. Tips of fingers expanded into broad disks twice as wide as the penultimate phalanx. Disks of toes narrower than those of fingers, about one and one-half times as wide as penultimate phalanx. One specimen has a series of small bumps or short ridges on the snout and eyelids, and sparser ridges on the back; the others are perfectly smooth above. Below, the skin is granular on the belly, around the anus, and on the throat of males.

Our 4 specimens cover a remarkable range of color patterns. The dorsal surface ranges from light tan to dark brown, with or without a large, dark brown, inverted "V" pattern on the back, from the front limbs nearly to the groin. A dark interorbital band may be present. At least a hint of dark marbling along sides near groin extending well onto lateral body surfaces and thighs, or confined to immediate region of groin and back of thighs. Ventrally white suffused with black flecks, very sparse or coalescing into dark brown-black reticulation over entire surface. A more or less well defined barring pattern present on the legs and feet.

*Taxonomic Notes.* We have compared these specimens to the holotype of *P. adspersus* (Günther) (BMNH 1947.2.6.23), and find them to match in all essentials except the color pattern, which is brown with an irregular pattern of brilliant, enamel white spots in *adspersus* (see Boulenger, 1882, pl. 10, fig. 8). While the color pattern of *adspersus* is strikingly different from that of *P. variabilis*, the latter species is so variable that we feel the recognition of a related species purely on color pattern must be considered suspect. We thus refer our material to *P. variabilis*.

*Ecological Notes.* Of our 4 specimens, 3 were collected in evergreen forest (1 at 310 m, 2 at 950), and one was collected in gallery forest. As in all of the *Philautus* in our collection, these frogs were found away from streams or ponds. Two individuals were on the leaves of trees 2-2.5 m above the ground, and one was on dead leaves on the ground.

**Rhacophorus malabaricus** Jerdon (Plate V)

*Rhacophorus malabaricus* Jerdon, 1870, Proc. Asiatic Soc., Bengal, 84—Malabar.

*Material.* 1 adult female 95.8 mm SV; 8 adult males 61.9-73.5 mm, mean 68.8. Tibia 0.50 of SV in female; 0.48-0.54 in males, mean 0.50.

In life, a bright leaf-green above and white below. Webbing of hand a pale orange-red, feet a more intense, nearly blood-red. A white line along outer edge of forearm, tarsus, and foot; triangular heel appendage white. In preservative, upper surfaces purplish, webbing fading to white. In several individuals numerous small white spots dorsally.

Males with a well-developed nuptial pad on the medial side of the first finger. In our series, the testes are greatly enlarged to 0.18-0.23 of SV. The single female contained numerous mature, unpigmented eggs.

*Larvae.* Six samples of larvae, extending from Stage 25 to premetamorphosis (Stage 42), fit Ferguson's (1904) description well. The most advanced larvae have fully webbed outer fingers.

Head-body lengths (mm) : 9.25 (Stage 26), 12.9-14.2 (Stages 31-32), 14.75 (Stage 36), 15.75-16.8 (Stages 38-39). Maximum tail length 46.67 mm (Stage 38). Tail length 1.72-1.95 of head-body length (3 individuals). Denticles of upper lip II : 5+5 (6 tadpoles) or II : 6+6(1); of lower lip 1+1 : II(7).

*Ecological Notes.* We found this frog in two different circumstances. One pair was



collected in evergreen forest, 350 m elevation, 3 m above a side pool in a stream flood plain. Foam nests were attached to vegetation several meters above the pool and tadpoles in various stages of development were collected there. Our other 7 specimens were collected from trees and shrubs (1-4 m above the ground) surrounding a small pond (approximately 8 m diameter and 1.5 m deep) formed by damming a 1 m wide stream in a disturbed area at 800 m elevation. The frogs were using this pool for breeding (Plate V), and numerous foam nests were seen in the leaves of trees surrounding the pond.

Two samples of tadpoles were reared from foam nests, one of which was attached to a palm frond overhanging a stream side pool and the other plastered against the rock wall above a pot-hole on a stream bank. The other free-swimming samples were obtained in stream side pools (3 samples) and in a rocky pot-hole on a stream bank.

**Hemidactylus frenatus** Schlegel

*Hemidactylus frenatus* Schlegel, in Dumeril & Bibron, 1836, Erp. Gen., 3: 366—Java; Smith, 1935, Fauna Brit. India, Rept., 2: 95.

*Material.* 2 females 61, 67 mm SV, 3 males 58-65 mm, 1 juvenile 28 mm. Tail 0.90-1.12 times SV (n=4). Femoral pores in males 37(2), 41, without a preanal gap. Supralabials 11(3), 12(2). All individuals with conspicuous rounded dorsal tubercles.

The fact that these geckos were found in forest rather than in houses obliged us to confirm the identification by comparison with *frenatus* from various parts of southern Asia. The color of one in life—underside of tail orange, chest yellow, tinged with orange—agrees well with Smith's notes (1935).

*Ecological Notes.* The juvenile was found on a small tree trunk (12 cm) 2 m above ground in deciduous forest. All 5 adults were in ever-

green forest at 310-360 m. One was on soil at the base of a tree buttress, the other 4 on tree trunks 2-4.5 m above ground. The trees measured 10, 80, 85, 110 cm DBH.

**Cnemaspis ornata** (Beddome)

*Gymnodactylus ornatus* Beddome, 1870, Madras Jour. Med. Sci., 1870, 1: 32—Tinnevely, India.

*Cnemaspis ornata* Smith, 1935, Fauna Brit. India, Rept., 2: 70.

*Material.* 9 females 46-56 mm SV, mean 52.0; 3 males 50-55 mm, mean 53.0; 2 juveniles. Tail 1.04-1.22 times SV in the 3 with complete, original tails. Enlarged scansors under fourth toe 3-4, the distal one much larger than the others but not projecting. Males with 8-10 preanal pores.

This series agrees well with Smith's (1935) description. In life, the light areas of the head, neck, and shoulders are yellowish green except for 2 pairs of white rectangular scapular spots. The color changes abruptly behind the shoulders to bluish grey with darker flecks.

*Ecological Notes.* Twelve of our animals were collected at 950 m, 1 at 660 m, and 1 at 300 m. All were in moist-evergreen forest, contrasting with Beddome's statement that this species occurs only in "dry jungle" (Smith 1935). Ten were caught during daylight hours, 5 under rocks, 1 in a rotting log, 1 on a rock, and 3 low on tree trunks. The 4 captured at night were on large rocks (3) and on a tree trunk. The rocks with which these lizards were associated were large, 6 of them 1-2.5 m across.

**Cnemaspis littoralis** (Jerdon)

*Gymnodactylus littoralis* Jerdon, 1853, Jour. Asiatic Soc. Bengal, 22: 469—Malabar.

*Cnemaspis littoralis* Smith, 1935, Fauna Brit. India, Rept., 2: 76.

*Material.* 2 females, one with mature ova, 33, 34 mm SV; 1 male 33 mm. Tail 1.12 times SV in one having an original tail. Male with 16/17 femoral pores, 12 scales separating the

series. Scansors 5-7 on fourth toe. As Smith (1935) noted, the distal scansors of the basal phalanges are strikingly enlarged.

*Ecological Notes.* All 3 were caught on tree trunks 0.25-1.5 m above ground during day-light hours, 2 in evergreen forest (310-360 m) and one in moist deciduous forest (260 m).

This is the first record of *littoralis* from the southern part of the Western Ghats.

**Cnemaspis nairi** Inger, Marx and Koshy

*Cnemaspis nairi* Inger, Marx & Koshy, 1984, *Herpetologica*, 40: 149 — Ponmudi, Kerala.

*Material.* 7 females 37-43 mm SV, 3 males 31-41 mm, 7 immature. Means and counts given in Inger *et al.* (1984).

*Ecological Notes.* This species was collected from 280 to 925 m, most animals coming from 310-360 m. They were caught mainly in evergreen forest (11), the remainder in moist-deciduous forest (1), thin secondary growth (2), gallery forest (1), and at the edge of a grassy area (1). Seven were found under rocks or logs and 2 under slabs of bark on a large log. Three others were caught on large rocks, 3 on floor litter, and 2 low (0.1 m) on tree trunks.

**Cnemaspis tropidogaster** (Boulenger)

*Gonatodes kandianus tropidogaster* Boulenger, 1885, *Cat. Lizards Brit. Mus.*, 1: 70—Ceylon and Tinnevely, Nilgiris, and Wynad, India.

*Cnemaspis kandiana* (part) Smith, 1935, *Fauna Brit. India*, Rept., 2: 74.

*Material.* 132 individuals; 40 females 26-35 mm SV, smallest with enlarged ova 29 mm, mean of those > 28 mm 31.7 (n=33), 14 were gravid; 53 males 26-33 mm, mean 29.9. Information on counts and taxonomic relationships given in Inger *et al.* (1984).

*Ecological Notes.* Six geckos were found in moist-deciduous forest, 1 in a gallery forest, and the rest in evergreen forest. Altitudinal range was: 110-145 m—5, 265-290 m—3, 300-

370 m—77, 450-570 m—11, 660 m—3, 870-950 m—33. Ninety one were caught on tree trunks, 42 within 1 m of the ground and only 5 above 2 m. Fourteen were caught on large rocks, 11 on dead leaves or on bare soil, and 13 under rocks or floor litter. Twelve of the 13 found on bare soil or on or under leaves were within buttress-enclosed areas.

**Draco dussumieri** Duméril & Bibron

*Draco dussumieri* Duméril & Bibron, 1837, *Erp. Gén.*, 4: 456—Malabar; Smith, 1935, *Fauna Brit. India*, Rept., 2: 143.

*Material.* 2 females 85, 87 mm SV, 2 males 72, 74 mm. One male was caught in a tree at an unknown height in a village (100 m) and the others in trees about 8 m above ground in evergreen forest (350-360 m). One male and a female were caught in the same tree (45 cm DBH).

**Otocryptis beddomi** Boulenger

*Otocryptis beddomi* Boulenger, 1885, *Cat. Lizards Brit. Mus.*, 1: 272—Sivagiri Ghat, India; Smith, 1935, *Fauna Brit. India*, Rept., 2: 147.

*Material.* 27 females, 4 lacking enlarged or yolked ova measure 30, 32, 33, 36 mm (first 3 subadult), 24 adult females 36-42 mm SV, mean 39.4; 28 males, smallest (probably subadult) 31 mm, adults 34-43 mm, mean 37.8. Difference between means statistically significant (t=2.51, P < 0.02).

Tail length 1.45-1.71 times SV, mean 1.62 (n=9). Foot length 0.40-0.47 times SV, mean 0.44 (n=12). Pit before shoulder distinct. Males occasionally with puffed gular sac, but never with distinct gular appendage. Coloration as described by Smith (1935) except that males have a distinct light vertebral band.

*Ecological Notes.* Twenty-two gravid females contained 3-5 near term ova each (mean 3.55). That such a high proportion was gravid and that we found no hatchlings indicate that the period of oviposition is restricted and was about to begin.



Seven individuals were caught in moist-deciduous forest, the rest in evergreen forest. Forty-one were collected at 300-365 m, 9 below that level (to 110 m) and 5 above (to 650 m). The bulk (32) were seen scampering over leaf litter. Only 14 were observed on shrubs (4) and trees (10), only 2 of these more than 1.5 m above ground and 7 below 1 m.

**Psammophilus blanfordanus** (Stoliczka)

*Charasia blanfordana* Stoliczka, 1871, Proc. Asiatic Soc. Bengal, 1871: 194—Central India.

*Psammophilus blanfordanus* Smith, 1935, Fauna Brit. India, Rept., 2: 210.

*Material.* 2 females 66, 71 mm SV, 1 male 104 mm. The tail of the male, the only individual with a complete tail, measured 209 mm. Scale rows 97-103. Scales under fourth toe 19-21.

*Ecological Notes.* One lizard was caught in deciduous forest (115 m), 1 in a rubber planting (280 m), and 1 in an agricultural clearing (550 m). All were on large rocks (3-5 m) when first seen.

The two females contained developing ova, the larger individual 4 and the smaller 6.

**Calotes calotes** (Linnaeus)

*Lacerta calotes* Linnaeus, 1758, Syst. Nat., ed. 10, 1: 207—Ceylon.

*Calotes calotes* Lonnberg, 1896, Bih. Svensk. Vet. Akad., 22: 15; Smith, 1935, Fauna Brit. India, Rept., 2: 201.

*Material.* 1 female 98 mm SV, 1 juvenile 41 mm. Tail 3.52 times SV in the female, 3.17 in the juvenile. Scale rows 31, 34. Scales under the fourth toe 29, 31.

*Ecological Notes.* The juvenile was caught in a rubber planting on the stem of a tall herb 1 m above ground. The female was caught at 9.7 m above ground on a branch of a tree (22 cm) in partly logged evergreen forest. Elevations were 145 and 265 m respectively.

**Calotes nemoricola** Jerdon (Plate VI)

*Calotes nemoricola* Jerdon, 1853, Jour. Asiatic Soc.

Bengal, 22: 471—Coonoor Ghat, Nilgiri Hills; Smith, 1935, Fauna Brit. India, Rept., 2: 199.

*Material.* 2 males 108, 110 mm SV. Tail 2.34, 2.40 times SV. Scale rows 39, 42. Scales under fourth toe 23, 28. Both were olive-green when caught, one quickly turning brown. The throat was orange-red in one.

*Ecological Notes.* One lizard was caught in a sapling (3 cm diameter) 2 m above the ground in a moist-deciduous forest (280 m). The second was caught at night asleep clinging to a slender branch of a shrub 1 m above ground in an evergreen forest (310 m).

These specimens appear to be the first of this species collected in the southern part of the Western Ghats, about 300 km south of the type locality.

**Calotes rouxi** Duméril & Bibron (Plate VI)

*Calotes rouxi* Duméril & Bibron, 1837, Erp. Gén., 4: 407—India; Smith, 1935, Fauna Brit. India, Rept., 2: 206.

*Calotes elliotti* Günther, 1864, Rept. Brit. India, p. 142—Malabar; Smith, 1935, Fauna Brit. India, Rept., 2: 207.

*Material.* 19 females 56-71 mm SV, mean 62.8; 4 males 63-66 mm, mean 64.5, 2 juveniles 26 mm. Tail 2.49-2.87 times SV in 16 individuals having complete tails. Scale rows 51-65, mean 58.7 (n=20); difference between the sexes not significant: males 52-65, females 51-65.

The throat and underside of the head may be rose or orange-red in both sexes; in several individuals these areas faded to whitish a short time after capture. Similarly, the enamel white spot on the upper lip of some individuals faded to dirty whitish.

*Taxonomic Notes.* Specimens collected by us are variable with respect to the two diagnostic characters used by Boulenger (1885) and Smith (1935) to distinguish *C. elliotti* from *C. rouxi*: a small spine behind the supraciliary ridge and a white spot below the orbit (see

tabulation).

	Post-orbital spine		
	Present	Present on one side only	Absent
Subocular white spot			
Present	1	2	5
Absent	2	5	5

There is no association among these characters as would be expected from Smith's key and description. No meristic differences between the two nominate forms appear in the descriptions of Boulenger or Smith. In our sample, the three with postorbital spines on both sides had 55-64 scale rows and 27-31 scales under the fourth toe; in the 10 lacking the spine these counts were 51-65 and 24-30; in the 7 variable lizards the counts were 52-65 and 27-30. Those with a subocular white spot had 52-65 scale rows and 24-30 scales under the fourth toe, those without the spot 51-65 and 27-31. Differences between pairs of data sets are not statistically significant.

In all other features Boulenger's and Smith's descriptions of the two forms are completely congruent and our sample permits no dichotomy on the basis of any character. We believe only a single species is involved.

*Ecological Notes.* Only 6 of the 25 collected were in non-arboreal positions: 3 on dead leaves (2 in buttress-enclosed areas) and 3 on rocks. The remainder were on small stumps (2), shrubs 0.5-3 m above ground (8), and on tree trunks 1-7.5 m high (9). Three were captured at night while sleeping on the mid-ribs of shrubby palm fronds. Altitudinal range was extensive: 110-145 m—4, 310-350 m—19, 470 m—1, 950 m—1. Those from 110-145 m were caught in deciduous forests, the rest in evergreen.

Clutch size varied from 1 to 3, mean 2.3 (n=18).

**Calotes versicolor (Daudin)**

*Agama versicolor* Daudin, 1802, Hist. Nat. Rept., 3: 395—India.

*Calotes versicolor* Jerdon, 1853, Jour. Asiatic Soc. Bengal, 22: 470; Smith, 1935, Fauna Brit. India, Rept., 2: 189.

*Material.* 3 females 75-83 mm SV, 3 males 74-94 mm. Tail 2.23-2.81 times SV (n=5). Scale rows 39-43 (n=5). Scales under fourth toe 22-26 (n=5).

*Ecological Notes.* Two lizards were collected in deciduous forest (130 m), 1 in a semi-open area around buildings (800 m), and 3 in natural grassland (900-970 m). Two were caught on rocks (30-50 cm), 3 on shrubs 1-1.8 m above ground, and 1 on a tree trunk (40 cm) 1.5 m above ground. The largest female contained 5 developing ova.

**Mabuya carinata (Schneider)**

*Scincus carinatus* (part) Schneider, 1801, Hist. Amph., 2: 183—no type locality.

*Mabouia carinata* Boulenger, 1887, Cat. Lizards Brit. Mus., 3: 181.

*Mabuya carinata* Smith, 1935, Fauna Brit. India, Rept., 2: 266.

*Material.* 1 female 115 mm SV, 1 male 118 mm, 2 juveniles 50, 66 mm. Tail length of male 223 mm, of larger juvenile 120 mm. Scale rows 32-33. Scales under fourth toe 15. Ventrals 57-63.

*Ecological Notes.* Two were caught in a natural grassy area at 900 m, 1 in a large camp clearing at 800 m, and 1 in a rubber planting at 290 m.

**Mabuya clivicola<sup>1</sup> sp. nov.**

*Diagnosis.* A medium-sized species of *Mabuya* distinguished from all other Indian species of the genus by the following combi-

<sup>1</sup> *clivicola* from *clivus*, hill (L.), and *cola*, dwelling in (L.).



nation of characters: lower eyelid scaly, supranasals widely separated, prefrontals narrowly in contact, dorsals weakly keeled, scales in 28 rows, 17-19 scales under fourth toe, a narrow dark vertebral stripe.

*Holotype.* Field number RFI 30095, an adult female, collected 8 May 1982 at Ponmudi, Trivandrum District, Kerala at 260 m above sea level. Deposited in NMNHL.

*Paratypes.* FMNH 216580-81, from the type locality, both adult females, the latter with 3 near term ova.

*Description of holotype.* Body moderately robust, head and neck of equal diameter; snout obtusely pointed; preorbital length of head equal to distance between eye and ear opening. All head scales smooth; rostral as wide as high, curving up on to dorsal surface of snout, strongly constricted above the rostralabial suture, posterior margin strongly convex; supranasals narrow, width less than half length, widely separated from each other, end of supranasal behind nasal opening; frontonasal about as wide as long, narrowly separated from frontal by prefrontals; prefrontals meeting at a point, posterior corner separating frontal from first supraocular on left side but not on right, lateral portion curving down on side of head, broadly in contact with both loreals and first supraocular; frontal longer than its distance from snout, broadly in contact with second supraocular on both sides and narrowly with first on right side; frontoparietals as wide as long, touching last 3 supraoculars; interparietal longer than wide, broadly in contact with nuchals; parietals widely separated, bordering last supraocular, 3 temporals, and nuchal; 4 supraoculars, second much the largest, its posterior border transverse, cutting across anterior border of frontoparietal; 5 supraciliaries, the first widest, the third longest; nasal tallest anteriorly, no

evident suture behind nostril; first loreal about twice as high as wide, much taller than second, touching first two labials; length of dorsal portion of second loreal greater than height, ventral portion less than height, touching second and third labials; 2 smaller scales between second loreal and large subocular labial; lower eyelid scaly; a row of very small scales between eyelid and subocular labial; 5 postoculars, each about half size of temporals; 6 supralabials, 4 small ones preceding large subocular scale and one following; mental below rostral and first supralabials; a large postmental between mental and first infralabial on each side; 2 large scales on each side behind postmental, both pairs separated in midline by central row of gulars. Ear opening smaller than second loreal, 3 small scales projecting into opening from dorsal portion of anterior border. One pair of rugose nuchals.

Scales in 28 rows; mid-dorsal scales with 5 weak keels; keels without spurs projecting beyond margins of scales; dorsals and ventrals subequal; preanals not enlarged; 46 ventrals between mental and vent; scales on dorsal surfaces of forelimbs smooth, those of hind limbs with 2 weak keels; subdigital scales obtusely keeled; scales on palm and sole rounded; 18 scales beneath fourth toe; dorsal and lateral caudal scales weakly tricarinate; subcaudals not enlarged.

Head, back, and tail olive-brown; a dark vertebral stripe on adjacent halves of mid-dorsal scale rows beginning at shoulder and ending shortly behind rear legs; a dark lateral band beginning at eye as a narrow stripe, continuing over ear, and widening to cover parts of 4 scale rows on trunk; band with a faint light margin dorsally; between eye and shoulder, band with a distinct light stripe ventrally which is in turn bordered by short, thin dark line; between limbs band bordered



ventrally by dark gray area that fades into grayish white of underside; head unmarked ventrally.

Measurements given below.

MEASUREMENTS AND COUNTS

	HOLOTYPES	PARATYPES	
	30095	216580	216581
Snout-vent (mm)	53	55	55
Head to ear opening (mm)	10.5	10.5	11
Head width (mm)	8	10	8
Axilla-groin (mm)	27	29	29
Scale rows	28	28	28
Ventrals	46	49	47
Scales under fourth toe	18	17	19

*Variation.* The paratypes are remarkably similar to the holotype in details of coloration and scutellation. The similarity is noteworthy in the dorsal constriction of the rostral, the narrow contact of the prefrontals, and the transverse border of the second supraocular, which prevents the usual wedging of the frontoparietal between the frontal and supraocular. The rear third of the parietals is rugose in the paratypes. In one (30524) the frontal touches the first supraocular on the right side but not on the left; in the other specimen the frontal is separated from the first supraocular on both sides. In one (31306) the dorsals are weakly 7-carinate.

*Comparisons.* Two other species of *Mabuya* were collected in the same general area, *macularia* and *carinata*. *Mabuya clivicola* differs from both in having weakly keeled dorsal scales in which, in contrast to the strongly keeled ones of the other two, the keels do not project beyond the rear margins of the scales. It also differs from both in having a single dark vertebral stripe, though *carinata* sometimes has a pair of dark dorsal stripes that run

along the outer halves of the middorsal scale rows. *M. clivicola* further differs from *carinata* in having fewer scale rows (30-32 in *carinata*), fewer ventrals (55-63 in *carinata*), and more scales under the fourth toe (only 15 in *carinata*). *Mabuya clivicola* differs from *macularia* in the shape of the rostral, which in *macularia* is gradually narrowed dorsally and not, as in *clivicola*, sharply constricted above the level of the labials; in having the prefrontals meeting; and in having more scales under the fourth toe (13-15 in *macularia*). In *macularia* the frontoparietals are always wedged between the rear of the second supraocular and the frontal; in *clivicola* that does not occur.

*Mabuya bibroni* Gray, which occurs along the coastal strand of southern India (Smith 1935), has a clear spectacle in the lower eyelid and further differs from *clivicola* in having strongly keeled scales, 2 pairs of nuchals, a squarish first loreal, and a light vertebral stripe. The other two South Indian species, *M. beddomi* (Jerdon) and *vertebralis* Boulenger, differ from *clivicola* in having the supranasals in contact and more scales (32-36). The boldly striped *beddomi* has more ventrals (55-62) than *clivicola* whereas *vertebralis* has fewer scales under the fourth toe (13-14) and more strongly keeled scales than *clivicola*. Among the more northerly Indian species, *dissimilis* (Hallowell), *aurata* (Linnaeus), and *innotata* (Blanford) differ from *clivicola* in having a spectacle in the lower eyelid and more scale rows (32-38). The supranasals meet in *dissimilis* and *aurata*, while *innotata* has a squarish first loreal; both these character states are absent in *clivicola*.

*Ecological Notes.* Two specimens of *M. clivicola* were caught in thin secondary growth, one of them on a road (310 m) and the other in a sun spot on bare soil (260 m). The third





*Above: Calotes nemoricola.*  
*Below: Calotes rouxi.*





*Above: Boiga ceylonensis.*  
*Below: Boiga nuchalis.*



was caught on a large rock in an open area of a tea plantation at 350 m.

**Mabuya macularia** (Blyth)

*Euprepes macularius* Blyth, 1853, Jour. Asiatic Soc. Bengal, 22 : 652 — Bengal.

*Mabuia macularia* Boulenger, 1887, Cat. Lizards Brit. Mus., 3 : 182.

*Mabuya macularia* Smith, 1935, Fauna Brit. India, Rept., 2 : 264.

*Material.* 88 specimens. Three hatchlings from eggs kept in the laboratory 26-28 mm SV; 25 young, presumably recently hatched, 25-32 mm, 5 additional young 36-41 mm, 3 subadults 48-52 mm; 30 adult females 58-69 mm, mean 62.9; 20 adult males 58-66 mm, mean 62.7. Tail in females 1.22-1.43 times SV (n=3), in males 1.36-1.48 (n=3). Scale rows 28 (12), 29 (2), 30 (1). Ventrals 41-46, mean 43.5 (n=15). Scales under fourth toe 13-15, mean 13.6 (n=17). The coloration of males in life matches the description of *Lygosoma dawsoni* Annandale (1909a), which Smith (1935) placed in the synonymy of *macularia*.

*Ecological Notes.* Ten of 13 females dissected had developing ova, though only 4 had shelled eggs. Clutch size was invariably 2. We found 8 clutches of 2 eggs each and one of a single egg. The eggs varied in length from 13 to 15 mm, the diameter from 0.69 to 0.81 of length. Eggs were identified to species on the basis of the embryos except for three that hatched in the field laboratory. Smith (1935) gave clutch size as 3-4. As he referred to an ovipositing female from Thailand, it is possible that clutch size varies geographically.

Most (76) of these skinks came from evergreen forest; 5 were caught in thin secondary growth, 4 in moist-deciduous forest, 2 in deciduous forest, and 1 in a rubber planting. Three-fourths (65) were collected between 300 and 370 m, 9 at 110-150 m, 6 at 280-295 m, and

8 at 450-550 m. Except for two individuals (one on a tree trunk at 2.5 m and one on a stump at 0.5 m), all were first observed at the ground level, 6 on rocks, 2 on logs, and the remainder on or under floor litter. Five clutches of eggs were found under dead leaves, 2 under a log, 1 in a rotting log, and 1 in a rotting stump.

**Ristella beddomi** Boulenger

*Ristella beddomi* Boulenger, 1887, Cat. Lizards Brit. Mus., 3 : 359, pl. 29, fig. 4 — southwestern India; Smith, 1935, Fauna Brit. India, Rept., 2 : 332.

*Material.* 2 females 36-37 mm SV, 5 males 34-39 mm, 1 juvenile 20 mm. Only one male had a complete tail, 1.35 times SV. Scale rows 26 (2), 28 (5). Ventrals 47-56, mean 50.4 (n=7). Scales under fourth toe 12-15, mean 13.7 (n=7).

Color in life dark reddish brown above; side of body satiny jet black with scattered turquoise scales forming dots; underside of head and neck pale yellow tinged with green, ending at a sharp boundary between forelimbs; remainder of chest, belly, and underside of limbs salmon; underside of tail darker salmon; yellowish eye ring. Juvenile (in preservative) with three narrow, light, dark-edged stripes on back, none on side.

*Ecological Notes.* Seven lizards were caught in evergreen forest and one in moist semi-deciduous forest at elevations from 190 to 510 m. All were found on forest floor, 3 under dead leaves, 1 on bare soil, and 4 on dead leaves. Three clutches of eggs, assigned to this species on the basis of head scales of embryos, were found under large rocks (2 clutches) and under dead leaves (1) in a buttress-enclosed area. Ova in a clutch of 3 measured 6.0 × 8.8 to 6.0 × 9.0 mm. The other clutches consisted of 2 ova each, both 6.0 × 9.0 in one and 5.8 × 8.7 and 6.0 × 8.7 in the other.



**Ristella travancorica** (Beddome)

*Ateuchosaurus travancoricus* (part) Beddome, 1870, Madras Jour. Med. Sci., 1870, p. 33 — Western Ghats.

*Ristella travancorica* Beddome, 1871, Madras Jour. Med. Sci., 1871, p. 402; Smith, 1935, Fauna Brit. India, Rept., 2 : 331.

*Material.* 41 specimens : 20 females 31-37 mm SV, mean 34.4; 9 males 33-37 mm, mean 34.8; 2 hatchlings 16 mm, 10 juveniles 19-28 mm. One adult male had a complete, original tail 1.57 times SV and two females 1.29 and 1.43 times SV. Scale rows 22 (1) and 24 (10). Ventrals 48-54, mean 50.6 (n=10).

These have the diagnostic characters that distinguish *travancorica* from the similar species, *R. rurki* (Boulenger 1887, Smith 1935): dorsals with two sharp keels, scale rows 24 or less, posterior loreal single.

*Ecological Notes.* Three females were gravid; each contained 2 shelled ova. A pair of eggs measuring  $5.33 \times 11.0$  and  $5.5 \times 11.2$  mm were found under a rock (25 cm); one was kept in dead leaves for 23 days before preserving, at which time the embryo was near term. A second pair of eggs, also found under a rock, hatched in the field laboratory.

All individuals were found in evergreen forests, only 5 below 500 m and 31 between 860 and 950 m above sea level. Three-fourths were caught under dead leaves (21) or rocks (11), 5 on bare soil, and 1 low (0.3 m) on a tree trunk. The last may have been disturbed by one of us from its usual floor habitat before we saw it.

**Sphenomorphus dussumieri**  
(Duméril & Bibron)

*Lygosoma dussumieri* Duméril & Bibron, 1839, Erp. Gén., 5 : 725 — Malabar; Smith, 1935, Fauna Brit. India, Rept., 2 : 286.

*Sphenomorphus dussumieri* Taylor, 1950, Univ. Kansas Sci. Bull., 33 : 497.

*Material.* 34 specimens: 17 juveniles 22-32

mm SV; 1 subadult 43 mm; 8 females 49-60 mm, mean 55.5; 8 males 52-64 mm, mean 58.3. Tail 1.72-1.81 times SV (n=5, males only). Scales rows 38 (2), 40 (7), 41 (1), 42 (2). Ventrals 73-85, mean 80.5 (n=10). Scales under fourth toe 20-24, mean 21.8 (n=10).

*Ecological Notes.* Females had either 3 (4 individuals) or 4 (3 individuals) developing ova.

Lizards were caught in evergreen forest (14), moist-deciduous forest (8), secondary growth (8), and in a rubber planting (4). Most (21) were captured at 110-150 m above sea level and the remainder between 265 and 350 m. Annandale (1909a) found *dussumieri* at the base of the hills in Travancore.

**Typhlops beddomi** Boulenger

*Typhlops beddomi* Boulenger, 1890, Fauna Brit. India, Rept. Batr., p. 237 — hills of South India; Smith, 1943, Fauna Brit. India, Rept., 3 : 54.

*Material.* 1 specimen total length 90 mm. Scale rows 18. Transverse rows of scales 203. All of the head scales, starting two scales behind the eyes, are almost entirely covered with small glandules. Above dark brown; each scale edged anteriorly with a purplish brown streak. Snout and ventral surface lighter tan.

*Ecological Notes.* This snake was found in a patch of gallery forest at 950 m elevation beneath a rock (diameter 50 cm).

**Typhlops braminus** (Daudin)

*Eryx braminus* Daudin, 1803, Hist. Nat. Rept., 7 : 279 — Vizagapatam, India.

*Typhlops braminus* Cuvier, 1829, Reg. Anim., ed. 2, 2: 73; Smith, 1943, Fauna Brit. India, Rept., 3 : 46.

*Material.* 1 specimen total length 145 mm. Scale rows 20. Transverse rows of scales 315. Glands of head scales as figured by Smith (1943, fig. 14).

*Ecological Notes.* This specimen was col-



lected beneath the bark of a 60 cm log in evergreen forest at 110 m elevation.

**Uropeltis ceylanicus** Cuvier

*Uropeltis ceylanicus* Cuvier, 1829, Reg. Anim., ed., 2, 2 : 76 — Ceylon; Smith, 1943, Fauna Brit. India, Rept., 3 : 80.

*Material.* 1 specimen total length 405 mm. Scale rows at mid-body 17. Ventrals 128; caudals 9.

*Ecological Notes.* This snake was found dead on a road through a tea plantation at 500 m above sea level.

**Amphiesma beddomi** (Günther)

*Tropidonotus beddomei* Günther, 1864, Rept. Brit. India, p. 269, pl. 22, fig. E — Nilgiris.

*Amphiesma beddomei* Malnate, 1960, Proc. Acad. Nat. Sci. Philadelphia, 112 : 50.

*Natrix beddomei* Smith, 1943, Fauna Brit. India, Rept., 3 : 306.

*Material.* 2 males total length 340, 500 mm, SV 250, 365 mm; 2 females total length 390, 565 mm, SV 300, 420 mm; 3 juveniles total length 150-180 mm, SV 115-130 mm. Eight supralabials. Temporals 1+1 (1), 1+2 (6). Scale rows at mid-body 19. Ventrals 136-140 (n=4); caudals male 76, female 61, 2 juveniles 68-73.

This sample exhibits the striking change in coloration with age described by Smith (1943).

*Ecological Notes.* All these snakes were found in evergreen forest well away from streams. Six were caught between 310 and 360 m above sea level and one at 950 m. Three individuals were found on or under dead leaves, 3 on the surface of the soil and the single high altitude snake under a 12 cm log. Two juveniles contained one small toad each (prey SV 10 mm) in their stomachs.

**Xenochrophis piscator** (Schneider)

*Hydrus piscator* Schneider, 1799, Hist. Amph., 1 : 247 — East Indies.

*Xenochrophis piscator* Malnate & Minton, 1965, Proc. Acad. Nat. Sci. Philadelphia, 117 : 19.

*Natrix piscator* Smith, 1943, Fauna Brit. India,

Rept., 3 : 293.

*Material.* 1 male total length 475 mm, SV 335; 4 females total length 210-300 mm, SV 155-225 mm. Nine supralabials (4) or 9/10 (1). Temporals 2+2 (3), 2+1/2, 2+2/3. Scale rows at mid-body 19. Ventrals 129 (male), 142 (1 female); caudals 76 (male), 74 (1 female).

The small specimens are dark brown dorsally, grading to light tan laterally, with black vertical bars each covering 3-4 scale rows in 4 or 5 alternating rows across the entire body. The adult male is uniform olive brown except for black bars on the lateral scale rows.

*Taxonomic Notes.* Smith (1943) described four races of this common Asian water snake. However, the juvenile and adult color patterns of these specimens straddle two of his forms.

*Ecological Notes.* We collected 3 individuals from permanent small streams (1-4 m wide) between 105 and 350 m above sea level in clearings of moist-deciduous and evergreen forest, a fourth in a temporary pool in secondary growth at 350 m, and the fifth crossing a road at 500 m. In addition, several were seen, but not collected, foraging at night around a dammed pool (c 6 m diameter) in secondary growth at 800 m.

**Elaphe helena** (Daudin)

*Coluber helena* Daudin, 1803, Hist. Nat. Rept., 6 : 277 — Vizagapatam, India.

*Elaphe helena* Shaw *et al.*, 1939, Jour. Darjeeling Nat. Hist. Soc., 14 : 78; Smith, 1943, Fauna Brit. India, Rept., 3 : 149.

*Material.* 1 juvenile total length 395 mm, SV 325 mm. Nine supralabials. Scale rows at mid-body 25. Ventrals 243, caudals 74.

Color brown with dark crossbands containing white ocelli. Ventrally with semi-circular black bands extending about one-fourth width of ventrals, giving a scalloped black edge to the yellow-tan belly. A white nuchal



collar, interrupted along the midline and surrounded by black bands.

According to Smith (1943) this nuchal pattern is confined to populations from the Western Ghats.

*Ecological Notes.* This specimen was collected at 8 a.m. at 800 m on a road.

**Oligodon affinis** Günther

*Oligodon affinis* Günther, 1862, Ann. Mag. Nat. Hist., (3), 9 : 58 — Anamallais; Smith, 1943, Fauna Brit. India, Rept., 3 : 230.

*Material.* 1 juvenile total length 245 mm, SV 225 mm. Six supralabials. Scale rows at mid-body 17. Ventrals 140; caudals 20. No loreal. Posterior nasal elongate.

Color brown with dark brown crossbars edged with white. Below white with more or less alternating black squares. Head with complex dark pattern as in Smith (1943, fig. 79).

This specimen differs from Smith's (1943) description in having one less supralabial and fewer caudals (23 lowest count given by Smith).

*Ecological Notes.* Our snake was collected on a streamside rock at the edge of a village at 100 m above sea level.

**Lycodon travancoricus** (Beddome)

*Cercaspis travancoricus* Beddome, 1870, Madras Monthly Jour. Med. Sci., 2 : 169 — Travancore hills, India.

*Lycodon travancoricus* Boulenger, 1890, Fauna Brit. India, Rept. Batr., p. 293; Smith, 1943, Fauna Brit. India, Rept., 3 : 259.

*Material.* 1 male total length 545 mm, SV 430 mm; 1 female total length 525 mm, SV 420 mm. Nine supralabials. Scale rows at mid-body 17. Ventrals 166 (male), 180 (female); caudals 68 (male), 63 (female). All caudals in the male single, the first 40 single in the female. Dorsal coloration purple-black with white crossbars.

*Ecological Notes.* Both snakes were caught the same night along on a trail in evergreen

forest at 310 m within a 30-minute interval. A steady rain was falling that evening.

**Xylophis stenorhynchus** (Günther)

*Geophis stenorhynchus* Günther, 1875, Proc. Zool. Soc. London, 1875 : 230 — Travancore.

*Xylophis stenorhynchus* Boulenger, 1890, Fauna Brit. India, Rept. Batr., p. 304; Smith, 1943, Fauna Brit. India, Rept., 3 : 343.

*Material.* 1 male total length 115 mm, SV 100 mm; 1 female total length 135 mm, SV 125 mm. Five supralabials. Scale rows at mid-body 15. Ventrals 102 (male), 119 (female); caudals 19 (male), 14 (female).

Dorsally dark brown with an iridescent sheen. Two lines of dark tipped scales on rows 2 and 4; a more or less well defined line of dark brown scales on row 3. A whitish collar 1-2 scales wide around entire neck. One snake has a distinct white temporal stripe.

*Ecological Notes.* Both specimens were collected in evergreen forest at 145 and 300 m above sea level under dead leaves. One was in the accumulated litter between buttresses of a tree 60 cm in diameter.

**Ahaetulla nasuta** (Lacépède)

*Coluber nasutus* Lacépède, 1789, Hist. Nat. Serp., 1 : 100 — Ceylon.

*Ahaetulla nasuta* Stejneger, 1933, Copeia, 1933 : 203.

*Dryophis nasutus*, Smith, 1935, Fauna Brit. India, Rept., 3 : 376.

*Material.* 3 males total length 650-1060 mm, SV 415-665 mm, mean 512 mm; 9 females total length 440-1330 mm, SV 290-870 mm, mean 611 mm. Eight supralabials, 1 snake with 9 on one side. Temporals variable, 1-2 anterior, 1-3 posterior, frequent asymmetries within individuals. Scale rows at mid-body 15. Ventrals in males 179-185, mean 181.6; in females 163-181, mean 176.1. Caudals in males 162-168, mean 165.6; in females 147-159, mean 153.4. Loreal present in only one snake.

In life brilliant grassy green above, paler



green below. A yellow line along the outer edge of the ventrals on each side extending to the vent. Smith (1943) lists several variants from this color pattern, none of which is represented in our sample.

*Ecological Notes.* A diurnal snake, 10 of 12 being caught during the day. Two individuals were found on exposed soil, one on a log, and one in a large tree 2 m above the ground in low branches. The remainder were taken from low shrubs, 2-2.5 m above the ground. One specimen was caught in secondary growth at 840 m above sea level; the rest were collected in evergreen forest (9) or in moist deciduous forest (2) between 145 and 350 m.

**Boiga ceylonensis** (Günther) (Plate VII)

*Dipsadomorphus ceylonensis* Günther, 1858, Cat. Col. Snakes Brit. Mus., p. 176 — Ceylon.

*Boiga ceylonensis* Smith, 1943, Fauna Brit. India, Rept., 3 : 351.

*Material.* 2 males, total lengths 755, 940 mm, SV 585, 725 mm; 1 juvenile total length 495 mm, SV 385 mm. Supralabials 8. Temporals 2+3. Scale rows at mid-body 19. Ventrals in males 228, 233; 218 in juvenile. Caudals in males 108, 112; in juvenile 102. Hemipenis covered with numerous short, closely set spines.

Color pattern of the head in all three specimens consisting of a light tan background with dark brown, symmetrical markings. A transverse bar along the posterior edge of each parietal, met on the midline by a longitudinal mid-dorsal streak extending posteriorly from the parietals 5-7 scales. A thin postorbital streak from the eye beyond the angle of the jaw immediately above the supralabials. A pair of dark chevrons more or less developed on the anterior margin of the parietals. Body covered dorsally with alternating dark and light blotches, producing a diffuse banded

pattern. Ventrally white with irregular dark brown flecks.

*Taxonomic Notes.* We here use *B. ceylonensis* in the restricted sense of Wall (1909), as opposed to the extended sense of Smith (1943), and consider at least *B. ceylonensis* and *B. nuchalis* to be valid species. *B. nuchalis* is discussed on p. 568.

*Ecological Notes.* Two specimens were collected at 310 m in evergreen forest, one on the soil surface and the other 60 cm above the ground in a low shrub. The third snake was taken in the early morning crossing a road at approximately 800 m above sea level.

**Boiga dightoni** (Boulenger)

*Dipsas dightoni* Boulenger, 1894, J. Bombay nat. Hist. Soc., 8 : 528 — Pirmaad, Travancore.

*Boiga dightoni* Smith, 1943, Fauna Brit. India, Rept., 3 : 359.

*Material.* 1 male total length 1170 mm, SV 920 mm; 1 female total length 965 mm, SV 770 mm. Female missing the tip of the tail. Eight supralabials. Scale rows at mid-body 23. Ventrals 248 and 239, caudals 111 and 90 in the male and female, respectively.

Above uniform light brown; supralabials tan with fine dark brown specks. Below light tan with dark brown flecks. The scale counts for the male is somewhat higher than the range given by Smith (1943 : ventrals 228-241, caudals 95-102). However, as Smith had only 3 specimens available, his ranges should be considered approximate. In all other characters our material agrees well with Smith's description.

This is a rare species in collections, with apparently only 3 specimens known other than the two reported here.

*Ecological Notes.* Both snakes were taken in secondary growth situations at high altitudes (700 and 840 m). The male was caught 1.3 m above ground in a small shrub at night



and contained a partially digested *Calotes versicolor* (SV 95 mm, total length 320 mm) swallowed head first.

***Boiga nuchalis* (Günther) (Plate VII)**

*Dipsas nuchalis* Günther, 1875, Proc. Zool. Soc. London, 1875 : 233 — west coast of India.

*Boiga ceylonensis* (part) Smith, 1943, Fauna Brit. India, Rept., 3 : 351.

**Material.** 2 males total length 705, 1155 mm, SV 560, 895 mm. Eight supralabials. Temporals 2+3. Scale rows at mid-body 23. Ventrals 248, 249; caudals 107, 108. Head elongate, snout blunt, eyes not protruding.

Head dark tan with a faint darker brown triangular patch extending from the posterior border of the parietals anteriorly over the head to the rostral. A nuchal collar of dark brown separated from the large dark patch by 2-3 scales. The collar is 3 scales wide in both specimens. A sharply defined dark streak from the posterior border of the eye to the last supralabial. Pattern of the body similar to that of *B. ceylonensis*, consisting of alternating crossbands of dark brown on a tan background. Ventrally light with brown flecks.

**Taxonomic Notes.** There has been disagreement in the literature concerning the validity of this form as a species distinct from *B. ceylonensis*. Wall (1909) divided *B. ceylonensis* into four species (*andamanensis*, *beddomi*, *ceylonensis*, and *nuchalis*) on the basis of ventral, subcaudal, and mid-body scale counts. Annandale (1909b) disagreed with Wall's judgement and Smith (1943) lists all 4 under *ceylonensis*, primarily because he could find no additional characters corroborating the scale count differences. We observe a difference in coloration; compare descriptions presented here.

**Ecological Notes.** Both specimens were caught at night, one on the ground in a large clearing and the other on a road at 200 m

elevation.

***Hypnale hypnale* (Merrem) (Plate VIII)**

*Cophias hypnale* Merrem, 1820, Syst. Amph., p. 155-  
"Levante."

*Hypnale hypnale* Gloyd, 1977, Proc. Biol. Soc. Washington, 90: 1009.

*Ancistrodon hypnale* Smith, 1943, Fauna Brit. India, Rept., 3: 499.

**Material.** 4 males total length 276-340 mm, SV 234-289 mm, mean 260.5 mm; 7 females total length 353-412 mm, SV 314-360 mm, mean 335.4 mm; 1 juvenile SV 132 mm. Seven supralabials. Scale rows at mid-body 17. Ventrals in males 135-141, mean 137.8; in females 133-141, mean 138.0. Caudals in males 40-42, mean 40.8; in females 33-35, mean 34.0.

**Ecological Notes.** Eight of the 12 in this sample were caught in evergreen forest, 3 in moist-deciduous forest, and 1 in secondary growth. Three were on rocks, one on a log, and the rest at ground level on soil or dead leaves. Altitudinal range was narrow, 105-350 m. One female (SV 354 mm) had a small mammal in the gut. Another (SV 340 mm) contained 5 near term embryos.

***Trimeresurus malabaricus* (Jerdon)**

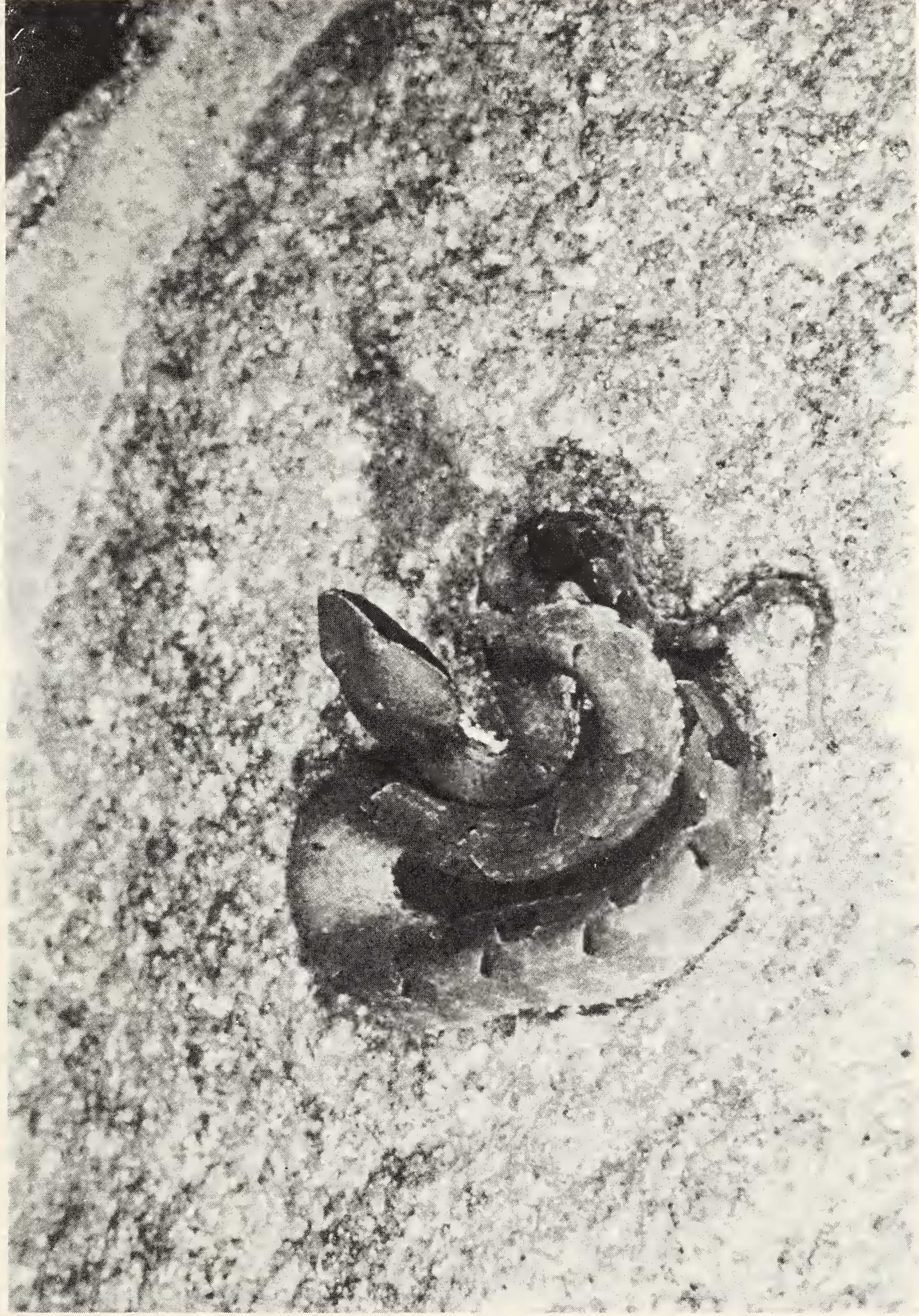
*Trigonocephalus malabaricus* Jerdon, 1854, Jour. Asiatic Soc. Bengal, 22: 523—Western Ghats.

*Trimeresurus malabaricus* Smith, 1943, Fauna Brit. India, Rept., 3: 513.

**Material.** 13 males total length 340-550 mm, SV 285-450 mm, mean 388 mm; 13 females total length 275-665 mm, SV 230-565 mm, mean 354 mm; 14 juveniles total length 185-285 mm, SV 155-240 mm. Supraoculars 1-5, variable between sides. Internasals 2-3 times size of adjacent scales and meeting in mid-line. Scale rows at mid-body 21 (38) or 23 (2). Ventrals in males 143-150, in females 138-146, in juveniles 135-152. Caudals in males 53-58, in females 51-59, in juveniles 48-60.

Coloration variable. Larger individuals





*Hypnale hypnale.*



(> 420 mm total length) dark brown with irregular green crossbars. In some specimens green predominates, with black saddles across the back. Head dark with scattered light green scales. Below mottled green and yellow; a few of the scales in the lowest lateral row sometimes yellow. Tail above brightly banded with green and black, occasionally with some yellow. Juveniles and a few of the adults light brown above with a series of dark brown, diamond-shaped saddles distinct or barely visible. In a few a second series of smaller brown spots on the first scale row bordering the caudals.

The two color phases in our sample are very similar to Smith's (1943) descriptions of the color patterns of *T. malabaricus* (greenish) and *T. strigatus* (brownish), both from the southern Western Ghats. However, the scale counts and condition of the second supralabial (very long and forming the anterior portion of the loreal pit) agree with *T. malabaricus* regardless of coloration. Several of our intermediate-sized animals appear to be in transition between the two color forms; that is, they retain the overall brown saddled pattern

but are becoming very dark, and the tail is assuming the green color.

*Ecological Notes.* Three snakes were caught in moist-deciduous forest, 35 in evergreen forest, and 2 in gallery forest extending into grassland from a block of evergreen forest. Altitudinal range was extensive, 110-920 m, although most (28) were found in the 300-375 m zone. Seven snakes were captured along water courses, 32 at some distance from streams, and one in a large clearing. About half (21) were found at the ground level, on dead leaves, rocks, and logs, and the remainder on herbaceous plants, shrubs, stumps, and trees from 0.1 to 3.0 m above the ground.

Only 4 of these snakes contained food remains. One juvenile (SV 240 mm) had an adult *Cnemaspis tropidogaster* (SV 32 mm) and another (SV 225 mm) had a *Rhacophorus* (probably *R. pleurostictus*, SV 31 mm). An adult female (SV 545 mm) had recently ingested a musk shrew (*Suncus murinus*, body length 120 mm), and another female (SV 565 mm) had mammal hair in its gut.

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